

Table 5a
Maximum Permissible Exposure (MPE) for Small-Source Ocular Exposure to a Laser Beam [†]

| Wavelength (μm) | Exposure Duration, t (s) | MPE | | Notes |
|----------------------------------|----------------------------------|-------------------------------------|-------------------------------------|--|
| | | ($\text{J} \cdot \text{cm}^{-2}$) | ($\text{W} \cdot \text{cm}^{-2}$) | |
| Ultraviolet | | | | |
| 0.180 to 0.302 | 10^{-9} to 3×10^4 | 3×10^{-3} | | or $0.56 t^{0.25}$ whichever is lower. (See Tables 8 and 9 for limiting apertures) |
| 0.303 | 10^{-9} to 3×10^4 | 4×10^{-3} | | |
| 0.304 | 10^{-9} to 3×10^4 | 6×10^{-3} | | |
| 0.305 | 10^{-9} to 3×10^4 | 10×10^{-3} | | |
| 0.306 | 10^{-9} to 3×10^4 | 16×10^{-3} | | |
| 0.307 | 10^{-9} to 3×10^4 | 25×10^{-3} | | |
| 0.308 | 10^{-9} to 3×10^4 | 40×10^{-3} | | |
| 0.309 | 10^{-9} to 3×10^4 | 63×10^{-3} | | |
| 0.310 | 10^{-9} to 3×10^4 | 0.1 | | |
| 0.311 | 10^{-9} to 3×10^4 | 0.16 | | |
| 0.312 | 10^{-9} to 3×10^4 | 0.25 | | |
| 0.313 | 10^{-9} to 3×10^4 | 0.40 | | |
| 0.314 | 10^{-9} to 3×10^4 | 0.63 | | |
| 0.315 to 0.400 | 10^{-9} to 10 | $0.56 t^{0.25}$ | | |
| 0.315 to 0.400 | 10 to 3×10^4 | 1.0 | | |
| Visible and Near Infrared | | | | |
| 0.400 to 0.700 | 10^{-13} to 10^{-11} | 1.5×10^{-8} | | (See Tables 8 and 9 for limiting apertures) For multiple pulses apply correction factor C_p given in Table 6. |
| 0.400 to 0.700 | 10^{-11} to 10^{-9} | $2.7 t^{0.75}$ | | |
| 0.400 to 0.700 | 10^{-9} to 18×10^{-6} | 5.0×10^{-7} | | |
| 0.400 to 0.700 | 18×10^{-6} to 10 | $1.8 t^{0.75} \times 10^{-3}$ | | |
| 0.400 to 0.450 | 10 to 100 | 1×10^{-2} | | |
| 0.450 to 0.500 | 10 to T_1 | | 1×10^{-3} | |
| 0.450 to 0.500 | T_1 to 100 | $C_B \times 10^{-2}$ | | |
| 0.400 to 0.500 | 100 to 3×10^4 | | $C_B \times 10^{-4}$ | |
| 0.500 to 0.700 | 10 to 3×10^4 | | 1×10^{-3} | |
| 0.700 to 1.050 | 10^{-13} to 10^{-11} | $1.5 C_A \times 10^{-8}$ | | |
| 0.700 to 1.050 | 10^{-11} to 10^{-9} | $2.7 C_A t^{0.75}$ | | |
| 0.700 to 1.050 | 10^{-9} to 18×10^{-6} | $5.0 C_A \times 10^{-7}$ | | |
| 0.700 to 1.050 | 18×10^{-6} to 10 | $1.8 C_A t^{0.75} \times 10^{-3}$ | | |
| 0.700 to 1.050 | 10 to 3×10^4 | | $C_A \times 10^{-3}$ | |
| 1.050 to 1.400 | 10^{-13} to 10^{-11} | $1.5 C_C \times 10^{-7}$ | | |
| 1.050 to 1.400 | 10^{-11} to 10^{-9} | $27.0 C_C t^{0.75}$ | | |
| 1.050 to 1.400 | 10^{-9} to 50×10^{-6} | $5.0 C_C \times 10^{-6}$ | | |
| 1.050 to 1.400 | 50×10^{-6} to 10 | $9.0 C_C t^{0.75} \times 10^{-3}$ | | |
| 1.050 to 1.400 | 10 to 3×10^4 | | $5.0 C_C \times 10^{-3}$ | |
| Far Infrared | | | | |
| 1.400 to 1.500 | 10^{-9} to 10^{-3} | 0.1 | | For multiple pulses apply correction factor C_p given in Table 6 (See Tables 8 and 9 for limiting apertures) |
| 1.400 to 1.500 | 10^{-3} to 10 | $0.56 t^{0.25}$ | | |
| 1.400 to 1.500 | 10 to 3×10^4 | | 0.1 | |
| 1.500 to 1.800 | 10^{-9} to 10 | 1.0 | | |
| 1.500 to 1.800 | 10 to 3×10^4 | | 0.1 | |
| 1.800 to 2.600 | 10^{-9} to 10^{-3} | 0.1 | | |
| 1.800 to 2.600 | 10^{-3} to 10 | $0.56 t^{0.25}$ | | |
| 1.800 to 2.600 | 10 to 3×10^4 | | 0.1 | |
| 2.600 to 10^3 | 10^{-9} to 10^{-7} | 1×10^{-2} | | |
| 2.600 to 10^3 | 10^{-7} to 10 | $0.56 t^{0.25}$ | | |
| 2.600 to 10^3 | 10 to 3×10^4 | | 0.1 | |

[†] See Table 6 and Figures 8 and 9 for correction factors C_B , C_C and time T_1 . For exposure durations greater than 10 seconds and extended sources in the retinal hazard region (0.400 to 1.4 μm), see Table 5b.

Notes:

- For repeated (pulsed) exposures, see Section 8.2.3.
- The wavelength region λ_1 to λ_2 means $\lambda_1 \leq \lambda < \lambda_2$, e.g., 0.180 to 0.302 μm means $0.180 \leq \lambda < 0.302 \mu\text{m}$.
- Dual Limit Application: In the Dual Limit Wavelength Region (0.400 to 0.600 μm), the listed MPE is the lower value of the photochemical and thermal MPEs as determined by T_1 .